

## **APPENDIX C: POTENTIAL OPPORTUNITIES AND RANKINGS**

## **APPENDIX C1: FREDERICK COUNTY PRIORITIZATION MATRICES**

## Stream Restoration Opportunity Prioritization Matrix

Ranking Components	Weight	Rating			Remarks
		1	2	3	
Nutrient and Impervious Acre Credit:					
Estimated TN Removed (lbs/yr)	2	<150	150 - 225	>225	Use revised default rate of 0.075 lb/ft/yr unless consultant strongly believes that a higher removal rate can be achieved through the use of an expert panel protocol, in which case best professional judgement should be used.
Estimated TP Removed (lbs/yr)	2	<136	136 - 204	>204	Use revised default rate of 0.068 lb/ft/yr unless consultant strongly believes that a higher removal rate can be achieved through the use of an expert panel protocol, in which case best professional judgement should be used.
Estimated TSS Removed (lbs/yr)	2	<89,760	89,760 - 134,640	>134,640	Use revised default rate of 44.88 lb/ft/yr unless consultant strongly believes that a higher removal rate can be achieved through the use of an expert panel protocol, in which case best professional judgement should be used.
Linear Feet	4	<1,500	1,500-3,000	>3,000	
Impervious Acre Credit (ac)	10	<15	15-30	>30	Based on the impervious acre equivalent of 0.01 acres per LF for non-RSC projects, or drainage area for RSC projects.
Subtotal	40				
Cost:					
Overall Planning Level Costs	3	>\$800K	\$600K - \$800K	<600K	Based on acceptable costs for these types of projects
Cost/Pound of Nitrogen Removed	1	> \$2,000	\$149 - \$2,000	\$149	Use construction cost of \$450 per LF and professional judgement if site requires additional costs
Cost/Pound of Phosphorus Removed	1	> \$5,000	\$800 - 5,000	\$800	Use construction cost of \$450 per LF and professional judgement if site requires additional costs
Cost/Pound of Sediment Removed	1	> \$10	\$1.55 - \$10	\$1.55	Use construction cost of \$450 per LF and professional judgement if site requires additional costs
Cost/Impervious Acre Treated	4	>\$80,000	\$60,000 - \$80,000	<\$60,000	Use construction cost of \$450 per LF and professional judgement if site requires additional costs
Subtotal	30				
Construction:					
Conflicts	4	Extensive Conflicts	Minor Conflicts	No Conflicts	Extensive conflicts impact 2 or more utility crossings and require significant design and construction efforts to move multiple utilities (i.e. sewer) or significant impacts to healthy riparian/upland habitats; Minor conflicts impact two or less utility crossings and do not require significant design and construction (i.e. cable) and minimal impacts to healthy riparian/upland habitats
Easement Requirements	2	Easement required for >8 properties	Easement required for ≤ 8 properties	No additional easement requirements or Temporary construction access easement only	Easement Required = the proposed project will occur on private property and the County will be required to obtain an easement from the current property owner in order to implement the project; Temporary Construction Access Only = the proposed project is located on County-owned property but in order to access the site for construction, a temporary easement will need to be acquired
Constructability/ Access	2	Difficult	Moderate	Easy	Criteria evaluated to rank constructability/access includes: site topography, wet/dry areas, wetland impacts, distance from road, and vegetation clearing.
Existing Forest Retention Ordinance (FRO) Present	2	Yes, >25% of the LOD	Yes, ≤25% of the LOD	No FRO present	Use the Frederick County Forest_Resource GIS layer
Subtotal	30				

### Stream Restoration Opportunity Prioritization Matrix (Continued)

Ranking Components	Weight	Rating			Remarks
		1	2	3	
Community and Watershed Impacts:					
Benthic IBI Score	4	Good/Fair	Poor	Very Poor	Use FCSS BIBI data
Land use/Impervious Cover Within Watershed	2	Damaged	Impacted	Sensitive	Use FCSS Land use and Impervious data. <b>Damaged</b> = Urban, actively urbanizing, or primarily agricultural. Typically less than 20% forest or >15% impervious. <b>Impacted</b> = Suburban development or active agriculture occurring. Typically 20-70% forested or 7-15% impervious. <b>Sensitive</b> = Rural communities or slow growth. Primarily forested and <7% impervious
Floodplain Connectivity	4	Connected	Incised with limited floodplain area	Incised with large floodplain area	Floodplain Connectivity should be based on field observations of incision, approximate bankfull height ratio (low top of bank height/bankfull height), and the adjacent floodplain or floodprone area. <b>Connected</b> = The stream channel is not incised and stormflows appear to have frequent access to the floodplain. <b>Incised with limited floodplain area</b> = Stormflows access the floodplain on rare occasions and floodplain area available for reconnection may be limited. <b>Incised with large floodplain area</b> = Only the largest stormwflows are able to access the floodplain; bank height is nearly twice bankfull depth throughout the reach. A large floodplain is available for reconnection.
Lateral Stability of Stream Channel	5	Stable	Moderately Stable	Unstable	The lateral stability of the reach should be based on field observations of active erosion and BEHI factors that are noted during the assessment. <b>Stable</b> = Stream banks are stable and have properties that should allow for continued resistance to erosion (i.e. low BEHI parameter ratings). <b>Moderately Stable</b> = Stream banks are moderately resistant to erosion, but signs of active erosion are present. <b>Unstable</b> = Stream banks are actively eroding and banks will likely continue to erode. Field indicators are typically raw banks, numerous fallen bank trees, and high BEHI parameters.
Proximity to Stormwater Management	2	No known stormwater management upstream	Under-performing /pre-2002 era stormwater management upstream	Post 2002 era stormwater management upstream or proposed retrofit	Frederick County NPDES BMP data (existing and proposed BMPs) and projects proposed during this watershed study should be used to determine the level of stormwater management upstream of the stream site.
Functional Lift Potential	3	Geomorphic Level	Physiochemical Level	Biological Level	This should take into account both existing and proposed conditions.
Subtotal	60				
	180				

Low score = bad candidate = low priority

High score = good candidate = high priority

Take the Rating Score multiplied by the weight

## Stormwater BMP Opportunity Prioritization Matrix

Ranking Components	Weight	Rating			Remarks
		1	2	3	
Nutrient and Impervious Acre Credit:					
Estimated TN Removed (lbs/yr)	2	<244	244 - 488	>488	Ranges based on other watershed study ratings
Estimated TP Removed (lbs/yr)	2	<29	29 - 57	>57	
Estimated TSS Removed (lbs/yr)	2	<14,000	14,000 - 29,000	>29,000	
Impervious Acre Credit (ac)	4	<5	5 - 15	>15	
Stormwater Era	10	1985-2002 BMP providing treatment of 1" or greater	1985-2002 BMP providing treatment of 0.5"	pre-1985	This is based on the design approval date from the County's Urban BMP database. If no date was available, the SWM BMP should be assigned a rating of 1.
Subtotal	60				
Cost:					
Overall Planning Level Costs	6	> \$800K	\$200K - \$800K	< \$200K	Ranges are based on acceptable costs to move projects forward as well as guidance provided by the Chesapeake & Atlantic Coastal Bays Trust Fund
Cost/Pound of Nitrogen Removed	2	> \$2,000	\$149 - \$2,000	\$149	
Cost/Pound of Phosphorus Removed	2	> \$5,000	\$800 - 5,000	\$800	
Cost/Pound of Sediment Removed	2	> \$10	\$1.55 - \$10	\$1.55	
Cost/Impervious Acre Treated	8	>80,000	\$54,000 - \$80,000	<\$54,000	
Subtotal	60				
Construction:					
Utility Conflicts	2	Extensive Conflicts	Minor Conflicts	No Conflicts	Extensive conflicts impact 2 or more utilities and require significant design and construction efforts to move multiple utilities (i.e. sewer); Minor conflicts impact two or less utilities and do not require significant design and construction (i.e. cable)
ROW Requirements/ Property Ownership	5	Easement required	Temporary construction access easement only	No additional ROW requirements	Easement Required = the proposed retrofit will occur on private property and the County will be required to obtain an easement from the current property owner in order to implement the project; Temporary Construction Access Only = the proposed retrofit is located on County-owned property but in order to access the site for construction, a temporary easement will need to be acquired
Constructability/ Access	3	Difficult	Moderate	Easy	Criteria evaluated to rank constructability/access includes: property ownership, site constraints, potential utility conflicts, site topography, and proposed grading.
Maintenance Burden	4	High Maintenance Requirements	Moderate Maintenance Requirements	Low Maintenance Requirements	Based on Table 4.5 from MD 2000 Manual
Proximity to Karst	2	Within karst area	Within 1/4 mile distance of karst	Outside karst area	Karst geology regions are characterized by formations underlain by carbonate rock and typified by the presence of limestone caverns and sinkholes. Specific design considerations are required for BMPs proposed within karst areas.

### Stormwater BMP Opportunity Prioritization Matrix (Continued)

Ranking Components	Weight	Rating			Remarks
		1	2	3	
Construction (cont.):					
Local/State/Federal Permitting Requirements	4	High	Moderate	Low	<b>High</b> = extensive permitting requirements including full wetland/stream permitting, forest resource ordinance, NOI for construction requiring public comment, etc. <b>Moderate</b> = significant permitting requirements including minor stream/wetland impacts, FRO, NOI for construction under the public comment threshold. <b>Low</b> = minor permitting requirements, likely just local permitting for grading and stormwater management review
Subtotal	60				
Community and Watershed Impacts:					
Proximity to Stream Restoration	10	No known stream restoration projects within or downstream of BMP	Proposed or existing stream restoration located upstream of BMP	Proposed or existing stream restoration located downstream of BMP	Frederick County NPDES BMP data (STREAM_RESTORED and STREAM_SITE_SELECTION feature classes) and projects proposed during this watershed study should be used to determine the presence/absence of nearby stream restoration projects.
Public Acceptance	2	Low	Moderate	High	Based on Table 4.5 from MD 2000 Manual
Public Safety	4	Proposed SWM BMP condition presents a potential public safety concern - Fencing is proposed	-	No public safety concern	Sites either pose a potential public safety concern or they do not pose a potential public safety concern. There are no sites with a 2 rating for this public safety category.
Partnership Opportunities	2	No partnership opportunities	Opportunities to partner with 1-3 outside stakeholders	Opportunities to partner with >3 outside stakeholders	
Public Visibility/Outreach Opportunity	2	Low visibility	Moderate visibility	High visibility	<b>Low visibility</b> sites have minimal opportunities for education/outreach. <b>Moderate visibility</b> sites have some opportunities for education/outreach. <b>High visibility</b> sites have significant opportunities for education/outreach.
Subtotal	60				
	240				

Low score = bad candidate = low priority

High score = good candidate = high priority

Take the Rating Score multiplied by the weight

## **APPENDIX C2: STREAM RESTORATION RANKINGS**

PROJECT NAME	NEW NPDES/BMP Number	Stream Length (FT)	Estimated TN Removed (lbs/yr)	Estimated TN Removed (lbs/yr) Score	Estimated TP Removed (lbs/yr)	Estimated TP Removed (lbs/yr) Score	Estimated TSS Removed (lbs/yr)	Estimated TSS Removed (lbs/yr) Score	Linear Feet	Linear Feet Score	Impervious Acre Credit (ac)	Impervious Acre Credit (ac) Score	Nutrient and Impervious Acre Credit Subtotal
11833 Beaver Dam Rd	LIPI-2018-STRE-0001	4298	322	6	292	6	192894	6	4298	12	42.98	30	60
11702 Nicholson Rd	LIPI-2018-STRE-0002	4976	373	6	338	6	223323	6	4976	12	49.76	30	60
10120 Clemsonville Rd	LIPI-2018-STRE-0003	4720	354	6	321	6	211834	6	4720	12	47.20	30	60
12701 Woodsboro Pike	LIPI-2018-STRE-0004	3170	238	6	216	6	142270	6	3170	12	31.70	30	60
12456 and 12506 Woodsboro Pike	LIPI-2018-STRE-0005	2561	192	4	174	4	114938	4	2561	8	25.61	20	40
13117 Bunker Hill Rd	LIPI-2018-STRE-0006	2075	156	4	141	4	93126	4	2075	8	20.75	20	40
11330B Clemsonville Rd	LIPI-2018-STRE-0007	2074	156	4	141	4	93081	4	2074	8	20.74	20	40
12601 and 21757 Keymar Rd	LIPI-2018-STRE-0008	2847	214	4	194	4	127773	4	2847	8	28.47	20	40
13202 Detour Road	LIPI-2018-STRE-0009	2467	185	4	168	4	110719	4	2467	8	24.67	20	40
11602 and 11629 Haughs Church Rd	LIPI-2018-STRE-0010	2245	168	4	153	4	100756	4	2245	8	22.45	20	40
12404 Simpsons Mill Rd	LIPI-2018-STRE-0011	1645	123	2	112	2	73828	2	1645	8	16.45	20	34
10345 and 10413 Fountain School Rd	LIPI-2018-STRE-0012	1655	124	2	113	2	74276	2	1655	8	16.55	20	34
12906, 12921, and 12951 Woodsboro Pike	LIPI-2018-STRE-0013	2278	171	4	155	4	102237	4	2278	8	22.78	20	40
Woodsoro Pike	LIPI-2018-STRE-0014	76	5.7	2	5	2	3411	2	76	4	0.76	10	20
13202 Coppermine Rd	LIPI-2018-STRE-0015	1243	93	2	85	2	55786	2	1243	4	12.43	10	20
14802 New Windsor Rd	LIPI-2018-STRE-0016	1062	80	2	72	2	47663	2	1062	4	10.62	10	20
11958 Keymar Road	LIPI-2018-STRE-0017	903	68	2	61	2	40527	2	903	4	9.03	10	20
Toll Road	LIPI-2018-STRE-0018	250	18.75	2	17	2	11220	2	250	4	2.50	10	20
11601 Keymar Rd	LIPI-2018-STRE-0019	743	56	2	51	2	33346	2	743	4	7.43	10	20
3165 Buffalo Rd	LIPI-2018-STRE-0020	446	33	2	30	2	20016	2	446	4	4.46	10	20
14802 Toll Rd	LIPI-2018-STRE-0021	1000	75	2	68	2	44880	2	1000	4	10.00	10	20
12342 Warner Rd	LIPI-2018-STRE-0022	367	28	2	25	2	16471	2	367	4	3.67	10	20
12737 Woodsboro Pike	LIPI-2018-STRE-0023	1049	79	2	71	2	47079	2	1049	4	10.49	10	20
12418 Warner Rd	LIPI-2018-STRE-0024	734	55	2	50	2	32942	2	734	4	7.34	10	20
11538 Handboard Rd	LIPI-2018-STRE-0025	643	48	2	44	2	28858	2	643	4	6.43	10	20



PROJECT NAME	NEW NPDES/BMP Number	Overall Planning Level Costs	Overall Planning Level Costs Score	Cost/Pound of Nitrogen Removed	Cost/Pound of Nitrogen Removed Score	Cost/Pound of Phosphorus Removed	Cost/Pound of Phosphorus Removed Score	Cost/Pound of Sediment Removed	Cost/Pound of Sediment Removed Score	Cost/Impervious Acre Treated	Cost/Impervious Acre Treated Score	Cost Subtotal
11833 Beaver Dam Rd	LIPI-2018-STRE-0001	\$ 481,376	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
11702 Nicholson Rd	LIPI-2018-STRE-0002	\$ 557,312	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
10120 Clemsonville Rd	LIPI-2018-STRE-0003	\$ 528,640	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12701 Woodsboro Pike	LIPI-2018-STRE-0004	\$ 355,040	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12456 and 12506 Woodsboro Pike	LIPI-2018-STRE-0005	\$ 286,832	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
13117 Bunker Hill Rd	LIPI-2018-STRE-0006	\$ 232,400	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
11330B Clemsonville Rd	LIPI-2018-STRE-0007	\$ 232,288	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12601 and 21757 Keymar Rd	LIPI-2018-STRE-0008	\$ 318,864	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
13202 Detour Road	LIPI-2018-STRE-0009	\$ 276,304	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
11602 and 11629 Haughs Church Rd	LIPI-2018-STRE-0010	\$ 251,440	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12404 Simpsons Mill Rd	LIPI-2018-STRE-0011	\$ 184,240	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
10345 and 10413 Fountain School Rd	LIPI-2018-STRE-0012	\$ 185,360	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12906, 12921, and 12951 Woodsboro Pike	LIPI-2018-STRE-0013	\$ 255,136	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
Woodsoro Pike	LIPI-2018-STRE-0014	\$ 8,512	9	\$ 9,996	1	\$ 11,025	1	\$ 16.70	1	\$ 74,970	8	20
13202 Coppermine Rd	LIPI-2018-STRE-0015	\$ 139,216	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
14802 New Windsor Rd	LIPI-2018-STRE-0016	\$ 118,944	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
11958 Keymar Road	LIPI-2018-STRE-0017	\$ 101,136	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
Toll Road	LIPI-2018-STRE-0018	\$ 28,000	9	\$ 9,996	1	\$ 11,025	1	\$ 16.70	1	\$ 74,970	8	20
11601 Keymar Rd	LIPI-2018-STRE-0019	\$ 83,216	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
3165 Buffalo Rd	LIPI-2018-STRE-0020	\$ 49,952	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
14802 Toll Rd	LIPI-2018-STRE-0021	\$ 112,000	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12342 Warner Rd	LIPI-2018-STRE-0022	\$ 41,104	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12737 Woodsboro Pike	LIPI-2018-STRE-0023	\$ 117,488	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
12418 Warner Rd	LIPI-2018-STRE-0024	\$ 82,208	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24
11538 Handboard Rd	LIPI-2018-STRE-0025	\$ 72,016	9	\$ 7,775	1	\$ 8,575	1	\$ 12.99	1	\$ 58,310	12	24

PROJECT NAME	NEW NPDES/BMP Number	Conflicts	Conflicts Score	Easement Requirements	Easement Requirements	Constructability/ Access	Constructability/ Access Score	Existing Forest Retention Ordinance (FRO) Present	Existing FRO Score	Construction Subtotal
11833 Beaver Dam Rd	LIPI-2018-STRE-0001	None	12	1	4	Easy	6	None	6	28
11702 Nicholson Rd	LIPI-2018-STRE-0002	Minor	8	1	4	Moderate	4	None	6	22
10120 Clemsonville Rd	LIPI-2018-STRE-0003	Minor	8	1	4	Easy	6	None	6	24
12701 Woodsboro Pike	LIPI-2018-STRE-0004	None	12	1	4	Moderate	4	None	6	26
12456 and 12506 Woodsboro Pike	LIPI-2018-STRE-0005	None	12	3	4	Easy	6	None	6	28
13117 Bunker Hill Rd	LIPI-2018-STRE-0006	None	12	1	4	Easy	6	None	6	28
11330B Clemsonville Rd	LIPI-2018-STRE-0007	None	12	1	4	Moderate	4	None	6	26
12601 and 21757 Keymar Rd	LIPI-2018-STRE-0008	None	12	2	4	Difficult	2	None	6	24
13202 Detour Road	LIPI-2018-STRE-0009	Minor	8	1	4	Moderate	4	None	6	22
11602 and 11629 Haughs Church Rd	LIPI-2018-STRE-0010	None	12	2	4	Moderate	4	None	6	26
12404 Simpsons Mill Rd	LIPI-2018-STRE-0011	Minor	8	1	4	Easy	6	None	6	24
10345 and 10413 Fountain School Rd	LIPI-2018-STRE-0012	None	12	2	4	Moderate	4	None	6	26
12906, 12921, and 12951 Woodsboro Pike	LIPI-2018-STRE-0013	None	12	3	4	Moderate	4	None	6	26
Woodsoro Pike	LIPI-2018-STRE-0014	Minor	8	2	4	Moderate	4	None	6	22
13202 Coppermine Rd	LIPI-2018-STRE-0015	None	12	1	4	Moderate	4	None	6	26
14802 New Windsor Rd	LIPI-2018-STRE-0016	None	12	1	4	Moderate	4	None	6	26
11958 Keymar Road	LIPI-2018-STRE-0017	None	12	1	4	Moderate	4	None	6	26
Toll Road	LIPI-2018-STRE-0018	None	12	3	4	Moderate	4	None	6	26
11601 Keymar Rd	LIPI-2018-STRE-0019	Minor	8	1	4	Moderate	4	None	6	22
3165 Buffalo Rd	LIPI-2018-STRE-0020	None	12	1	4	Difficult	2	None	6	24
14802 Toll Rd	LIPI-2018-STRE-0021	None	12	1	4	Moderate	4	None	6	26
12342 Warner Rd	LIPI-2018-STRE-0022	Minor	8	1	4	Moderate	4	None	6	22
12737 Woodsboro Pike	LIPI-2018-STRE-0023	None	12	1	4	Moderate	4	None	6	26
12418 Warner Rd	LIPI-2018-STRE-0024	Minor	8	1	4	Moderate	4	None	6	22
11538 Handboard Rd	LIPI-2018-STRE-0025	Minor	8	1	4	Moderate	4	None	6	22

PROJECT NAME	NEW NPDES/BMP Number	Benthic IBI	Benthic IBI Score	Land Use/Impervious Cover Within Watershed	Land Use/Impervious Cover Within Watershed Score	Floodplain Connectivity	Floodplain Connectivity Score	Lateral Stability of Stream Channel	Lateral Stability of Stream Channel Score
11833 Beaver Dam Rd	LIPI-2018-STRE-0001	Poor	8	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
11702 Nicholson Rd	LIPI-2018-STRE-0002	Poor	8	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
10120 Clemsonville Rd	LIPI-2018-STRE-0003	Poor	8	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
12701 Woodsboro Pike	LIPI-2018-STRE-0004	Fair	4	Damaged	2	Disconnected with large floodplain area	12	Moderately Stable	10
12456 and 12506 Woodsboro Pike	LIPI-2018-STRE-0005	Poor	8	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
13117 Bunker Hill Rd	LIPI-2018-STRE-0006	Poor	8	Damaged	2	Disconnected with large floodplain area	12	Moderately Stable	10
11330B Clemsonville Rd	LIPI-2018-STRE-0007	Poor	8	Damaged	2	Disconnected with limited floodplain area	8	Unstable	15
12601 and 21757 Keymar Rd	LIPI-2018-STRE-0008	Fair	4	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
13202 Detour Road	LIPI-2018-STRE-0009	No Score	0	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
11602 and 11629 Haughs Church Rd	LIPI-2018-STRE-0010	Poor	8	Damaged	2	Connected	4	Moderately Stable	10
12404 Simpsons Mill Rd	LIPI-2018-STRE-0011	Poor	8	Damaged	2	Disconnected with limited floodplain area	8	Unstable	15
10345 and 10413 Fountain School Rd	LIPI-2018-STRE-0012	Poor	8	Damaged	2	Disconnected with limited floodplain area	8	Moderately Stable	10
12906, 12921, and 12951 Woodsboro Pike	LIPI-2018-STRE-0013	Fair	4	Damaged	2	Disconnected with limited floodplain area	8	Moderately Stable	10
Woodsboro Pike	LIPI-2018-STRE-0014	Poor	8	Damaged	2	Disconnected with large floodplain area	12	Unstable	15
13202 Coppermine Rd	LIPI-2018-STRE-0015	Poor	8	Damaged	2	Connected	4	Unstable	15
14802 New Windsor Rd	LIPI-2018-STRE-0016	Very Poor	12	Damaged	2	Disconnected with limited floodplain area	8	Stable	5
11958 Keymar Road	LIPI-2018-STRE-0017	Fair	4	Damaged	2	Disconnected with limited floodplain area	8	Moderately Stable	10
Toll Road	LIPI-2018-STRE-0018	Fair	4	Damaged	2	Disconnected with limited floodplain area	8	Unstable	15
11601 Keymar Rd	LIPI-2018-STRE-0019	Fair	4	Damaged	2	Disconnected with limited floodplain area	8	Unstable	15
3165 Buffalo Rd	LIPI-2018-STRE-0020	Poor	8	Damaged	2	Disconnected with limited floodplain area	8	Stable	5
14802 Toll Rd	LIPI-2018-STRE-0021	Poor	8	Damaged	2	Connected	4	Stable	5
12342 Warner Rd	LIPI-2018-STRE-0022	Poor	8	Damaged	2	Connected	4	Stable	5
12737 Woodsboro Pike	LIPI-2018-STRE-0023	Fair	4	Damaged	2	Connected	4	Moderately Stable	10
12418 Warner Rd	LIPI-2018-STRE-0024	Poor	8	Damaged	2	Connected	4	Stable	5
11538 Handboard Rd	LIPI-2018-STRE-0025	No Score	0	Damaged	2	Connected	4	Stable	5

PROJECT NAME	NEW NPDES/BMP Number	Proximity to Stormwater Management	Proximity to Stormwater Management Score	Functional Lift Potential	Functional Lift Potential Score	Community and Watershed Impacts Subtotal	GRAND TOTALS	TIER	RANKING
11833 Beaver Dam Rd	LIPI-2018-STRE-0001	a stormwater management upstream or prop	6	Biological	9	52	164		1
11702 Nicholson Rd	LIPI-2018-STRE-0002	a stormwater management upstream or prop	6	Biological	9	52	158		2
10120 Clemsonville Rd	LIPI-2018-STRE-0003	None in watershed	2	Biological	9	48	156		3
12701 Woodsboro Pike	LIPI-2018-STRE-0004	None in watershed	2	Geomorphic	3	33	143		4
12456 and 12506 Woodsboro Pike	LIPI-2018-STRE-0005	a stormwater management upstream or prop	6	Physiochemical	6	49	141		5
13117 Bunker Hill Rd	LIPI-2018-STRE-0006	a stormwater management upstream or prop	6	Biological	9	47	139		6
11330B Clemsonville Rd	LIPI-2018-STRE-0007	None in watershed	2	Biological	9	44	134		7
12601 and 21757 Keymar Rd	LIPI-2018-STRE-0008	None in watershed	2	Physiochemical	6	41	129		8
13202 Detour Road	LIPI-2018-STRE-0009	a stormwater management upstream or prop	6	Physiochemical	6	41	127		9
11602 and 11629 Haughs Church Rd	LIPI-2018-STRE-0010	a stormwater management upstream or prop	6	Geomorphic	3	33	123		10
12404 Simpsons Mill Rd	LIPI-2018-STRE-0011	None in watershed	2	Physiochemical	6	41	123		10
10345 and 10413 Fountain School Rd	LIPI-2018-STRE-0012	None in watershed	2	Biological	9	39	123		10
12906, 12921, and 12951 Woodsboro Pike	LIPI-2018-STRE-0013	None in watershed	2	Geomorphic	3	29	119		13
Woodsoro Pike	LIPI-2018-STRE-0014	a stormwater management upstream or prop	6	Geomorphic	3	46	108		14
13202 Coppermine Rd	LIPI-2018-STRE-0015	None in watershed	2	Physiochemical	6	37	107		15
14802 New Windsor Rd	LIPI-2018-STRE-0016	None in watershed	2	Geomorphic	3	32	102		16
11958 Keymar Road	LIPI-2018-STRE-0017	None in watershed	2	Physiochemical	6	32	102		16
Toll Road	LIPI-2018-STRE-0018	None in watershed	2	Geomorphic	3	34	100		18
11601 Keymar Rd	LIPI-2018-STRE-0019	None in watershed	2	Geomorphic	3	34	100		18
3165 Buffalo Rd	LIPI-2018-STRE-0020	a stormwater management upstream or prop	6	Geomorphic	3	32	100		18
14802 Toll Rd	LIPI-2018-STRE-0021	None in watershed	2	Biological	9	30	100		18
12342 Warner Rd	LIPI-2018-STRE-0022	None in watershed	2	Biological	9	30	96		22
12737 Woodsboro Pike	LIPI-2018-STRE-0023	None in watershed	2	Geomorphic	3	25	95		23
12418 Warner Rd	LIPI-2018-STRE-0024	None in watershed	2	Physiochemical	6	27	93		24
11538 Handboard Rd	LIPI-2018-STRE-0025	None in watershed	2	Biological	9	22	88		25

## **APPENDIX C3: STORMWATER BMP RANKINGS**

PROJECT NAME	NPDES/BMP Number	Impervious Area (ac)	Drainage Area (ac)	WQv (ac-ft)	Min WQv (0.2"*DA/12)	Estimated TN Removed (lbs/yr)	Estimated TN Removed (lbs/yr) Score	Estimated TP Removed (lbs/yr)	Estimated TP Removed (lbs/yr) Score	Estimated TSS Removed (lbs/yr)	Estimated TSS Removed (lbs/yr) Score	Impervious Acre Credit (ac)	Impervious Acre Credit (ac) Score	Stormwater Era	Stormwater Era Score	Nutrient and Impervious Acre Credit Subtotal
North Glade Feed & Supply	LIPI-2018-DSWA-0001	2.58	19.49	0.27	0.32	0.11	2	0.0021	2	1.44	2	2.57893	4	New - 2018	10	20
Tarr Drive	LIPI-2018-RSC-0001	2.88	37.37	0.37	0.62	0.21	2	0.0040	2	2.76	2	2.88	4	New - 2019	10	20
Bunker Hill	LIPI-2018-DSWA-0002	1.71	10.52	0.17	0.18	0.06	2	0.0011	2	0.78	2	1.71	4	New - 2018	10	20
Woodsboro Pike 2	LIPI-2018-RSC-0002	0.00	0.66	0.00	0.01	0.00	2	0.0001	2	0.05	2	0	4	New - 2020	10	20
Detour Road	LIPI-2018-DSWA-0003	0.30	6.64	0.05	0.11	0.04	2	0.0007	2	0.49	2	0.3	4	New - 2018	10	20

PROJECT NAME	NPDES/BMP Number	Overall Planning Level Costs	Overall Planning Level Costs Score	Cost/Pound of Nitrogen Removed	Cost/Pound of Nitrogen Removed Score	Cost/Pound of Phosphorus Removed	Cost/Pound of Phosphorus Removed Score	Cost/Pound of Sediment Removed	Cost/Pound of Sediment Removed Score	Cost/Impervious Acre Treated	Cost/Impervious Acre Treated Score	Cost Subtotal
North Glade Feed & Supply	LIPI-2018-DSWA-0001	\$ 1,600	18	\$ 76,836	2	\$ 4,042,129	2	\$ 5,793	2	\$ 3,230	24	48
Tarr Drive	LIPI-2018-RSC-0001	\$ 12,816	18	\$ 320,949	2	\$ 16,884,213	2	\$ 24,199	2	\$ 74,970	16	40
Bunker Hill	LIPI-2018-DSWA-0002	\$ 40,720	18	\$ 3,622,420	2	\$ 190,565,141	2	\$ 273,128	2	\$ 123,976	8	32
Woodsboro Pike 2	LIPI-2018-RSC-0002	\$ 5,760	18	\$ 8,167,427	2	\$ 429,665,002	2	\$ 615,818	2	\$ 74,970	16	40
Detour Road	LIPI-2018-DSWA-0003	\$ 7,312	18	\$ 1,030,564	2	\$ 54,215,009	2	\$ 77,704	2	\$ 126,894	8	32

PROJECT NAME	NPDES/BMP Number	Utility Conflicts	Utility Conflicts Score	ROW Requirements/Property Ownership	ROW Requirements/Property Ownership Score	Constructability/Access	Constructability/Access Score	Maintenance Burden	Maintenance Burden Score	Proximity to Karst	Proximity to Karst Score	Local/State/Federal Permitting Requirements	Local/State/Federal Permitting Requirements Score	Construction Subtotal
North Glade Feed & Supply	LIPI-2018-DSWA-0001	Minor	4	Easement Required	5	Difficult	9	Moderate	8	Outside of Karst Area	6	Low	12	44
Tarr Drive	LIPI-2018-RSC-0001	None	6	Easement Required	5	Difficult	9	Moderate	8	Outside of Karst Area	6	Low	12	46
Bunker Hill	LIPI-2018-DSWA-0002	Minor	4	No additional ROW requirements	15	Moderate	6	Moderate	8	Outside of Karst Area	6	Low	12	51
Woodsboro Pike 2	LIPI-2018-RSC-0002	Minor	4	Easement Required	5	Moderate	6	Moderate	8	Outside of Karst Area	6	Low	12	41
Detour Road	LIPI-2018-DSWA-0003	Extensive	2	Easement Required	5	Moderate	6	Moderate	8	Outside of Karst Area	6	Low	12	39



PROJECT NAME	NPDES/BMP Number	Proximity to Stream Restoration	Proximity to Stream Restoration Score	Public Acceptance	Public Acceptance Score	Public Safety	Public Safety Score	Partnership Opportunities	Partnership Opportunities Score	Public Visibility/Outreach Opportunity	Public Visibility/Outreach Opportunity Score	Community and Watershed Impacts Subtotal	GRAND TOTALS	TIER	RANKING
North Glade Feed & Supply	LIPI-2018-DSWA-0001	Proposed or existing stream restoration downstream	30	High	6	No concern	12	1-3 outside stakeholders	4	Moderate	4	56	168		1
Tarr Drive	LIPI-2018-RSC-0001	Proposed or existing stream restoration downstream	30	High	6	No concern	12	1-3 outside stakeholders	4	Low	2	54	160		2
Bunker Hill	LIPI-2018-DSWA-0002	Proposed or existing stream restoration downstream	30	High	6	No concern	12	1-3 outside stakeholders	4	Low	2	54	157		3
Woodsboro Pike 2	LIPI-2018-RSC-0002	Proposed or existing stream restoration downstream	30	High	6	No concern	12	1-3 outside stakeholders	4	Low	2	54	155		4
Detour Road	LIPI-2018-DSWA-0003	Proposed or existing stream restoration downstream	30	High	6	No concern	12	1-3 outside stakeholders	4	Low	2	54	145		5

**APPENDIX C4: PLANNING AND CONSTRUCTION COST ESTIMATE MATRIX**

NPDES/BMP Number	Stream ID	Construction Cost**	Contingency (10% of Const.)	Total Const.Cost	D&E (32% of Const.)	Inspection (10% of Const.)	Land Acquisition
LIPI-2018-STRE-0001	34	\$1,504,300.00	\$150,430.00	<b>\$1,654,730.00</b>	\$481,376.00	\$150,430.00	
LIPI-2018-STRE-0002	109	\$1,741,600.00	\$174,160.00	<b>\$1,915,760.00</b>	\$557,312.00	\$174,160.00	
LIPI-2018-STRE-0003	21	\$1,652,000.00	\$165,200.00	<b>\$1,817,200.00</b>	\$528,640.00	\$165,200.00	
LIPI-2018-STRE-0004	94	\$1,109,500.00	\$110,950.00	<b>\$1,220,450.00</b>	\$355,040.00	\$110,950.00	
LIPI-2018-STRE-0005	112, 104, 114	\$896,350.00	\$89,635.00	<b>\$985,985.00</b>	\$286,832.00	\$89,635.00	
LIPI-2018-STRE-0006	38	\$726,250.00	\$72,625.00	<b>\$798,875.00</b>	\$232,400.00	\$72,625.00	
LIPI-2018-STRE-0007	85	\$725,900.00	\$72,590.00	<b>\$798,490.00</b>	\$232,288.00	\$72,590.00	
LIPI-2018-STRE-0008	55, 53	\$996,450.00	\$99,645.00	<b>\$1,096,095.00</b>	\$318,864.00	\$99,645.00	
LIPI-2018-STRE-0009	130	\$863,450.00	\$86,345.00	<b>\$949,795.00</b>	\$276,304.00	\$86,345.00	
LIPI-2018-STRE-0010	111, 115	\$785,750.00	\$78,575.00	<b>\$864,325.00</b>	\$251,440.00	\$78,575.00	

NPDES/BMP Number	Project Management (5% of (D&E plus Const)	Site Improvement (8% of Const.)	Total Cost	Linear Feet	Impervious Acres	MDE Impervious Acre Equiv.	Cost per Impervious Acre	Source of Project	Comments
LIPI-2018-STRE-0001	\$99,283.80	\$120,344.00	\$2,506,163.80	4298.00		42.98	58310		11833 Beaver Dam Rd
LIPI-2018-STRE-0002	\$114,945.60	\$139,328.00	\$2,901,505.60	4976.00		49.76	58310		11702 Nicholson Rd
LIPI-2018-STRE-0003	\$109,032.00	\$132,160.00	\$2,752,232.00	4720.00		47.20	58310		10120 Clemsonville Rd
LIPI-2018-STRE-0004	\$73,227.00	\$88,760.00	\$1,848,427.00	3170.00		31.70	58310		12701 Woodsboro Pike
LIPI-2018-STRE-0005	\$59,159.10	\$71,708.00	\$1,493,319.10	2561.00		25.61	58310		12456 and 12506 Woodsboro Pike
LIPI-2018-STRE-0006	\$47,932.50	\$58,100.00	\$1,209,932.50	2075.00		20.75	58310		13117 Bunker Hill Rd
LIPI-2018-STRE-0007	\$47,909.40	\$58,072.00	\$1,209,349.40	2074.00		20.74	58310		11330B Clemsonville Rd
LIPI-2018-STRE-0008	\$65,765.70	\$79,716.00	\$1,660,085.70	2847.00		28.47	58310		12601 and 21757 Keymar Rd
LIPI-2018-STRE-0009	\$56,987.70	\$69,076.00	\$1,438,507.70	2467.00		24.67	58310		13202 Detour Road
LIPI-2018-STRE-0010	\$51,859.50	\$62,860.00	\$1,309,059.50	2245.00		22.45	58310		11602 and 11629 Haughs Church Rd

LIPI-2018-STRE-0011	49	\$575,750.00	\$57,575.00	<b>\$633,325.00</b>	\$184,240.00	\$57,575.00	
LIPI-2018-STRE-0012	9, 10	\$579,250.00	\$57,925.00	<b>\$637,175.00</b>	\$185,360.00	\$57,925.00	
LIPI-2018-STRE-0013	95, 102, 97	\$797,300.00	\$79,730.00	<b>\$877,030.00</b>	\$255,136.00	\$79,730.00	
LIPI-2018-STRE-0014	117	\$34,200.00	\$3,420.00	<b>\$37,620.00</b>	\$10,944.00	\$3,420.00	
LIPI-2018-STRE-0015	13	\$435,050.00	\$43,505.00	<b>\$478,555.00</b>	\$139,216.00	\$43,505.00	
LIPI-2018-STRE-0016	4	\$156,100.00	\$15,610.00	<b>\$171,710.00</b>	\$49,952.00	\$15,610.00	
LIPI-2018-STRE-0017	42	\$316,050.00	\$31,605.00	<b>\$347,655.00</b>	\$101,136.00	\$31,605.00	
LIPI-2018-STRE-0018	12	\$112,500.00	\$11,250.00	<b>\$123,750.00</b>	\$36,000.00	\$11,250.00	
LIPI-2018-STRE-0019	87	\$260,050.00	\$26,005.00	<b>\$286,055.00</b>	\$83,216.00	\$26,005.00	
LIPI-2018-STRE-0020	8	\$371,700.00	\$37,170.00	<b>\$408,870.00</b>	\$118,944.00	\$37,170.00	
LIPI-2018-STRE-0021	25	\$350,000.00	\$35,000.00	<b>\$385,000.00</b>	\$112,000.00	\$35,000.00	
LIPI-2018-STRE-0022	120	\$128,450.00	\$12,845.00	<b>\$141,295.00</b>	\$41,104.00	\$12,845.00	
LIPI-2018-STRE-0023	100	\$367,150.00	\$36,715.00	<b>\$403,865.00</b>	\$117,488.00	\$36,715.00	
LIPI-2018-STRE-0024	121	\$256,900.00	\$25,690.00	<b>\$282,590.00</b>	\$82,208.00	\$25,690.00	

LIPI-2018-STRE-0011	\$37,999.50	\$46,060.00	\$959,199.50	1645.00		16.45	58310		12404 Simpsons Mill Rd
LIPI-2018-STRE-0012	\$38,230.50	\$46,340.00	\$965,030.50	1655.00		16.55	58310		10345 and 10413 Fountain School Rd
LIPI-2018-STRE-0013	\$52,621.80	\$63,784.00	\$1,328,301.80	2278.00		22.78	58310		12906, 12921, and 12951 Woodsboro Pike
LIPI-2018-STRE-0014	\$2,257.20	\$2,736.00	\$56,977.20	76.00		0.76	\$74,970.00		Woodsboro Pike 4
LIPI-2018-STRE-0015	\$28,713.30	\$34,804.00	\$724,793.30	1243.00		12.43	58310		13202 Coppermine Rd
LIPI-2018-STRE-0016	\$10,302.60	\$12,488.00	\$260,062.60	446.00		4.46	58310		3165 Buffalo Rd
LIPI-2018-STRE-0017	\$20,859.30	\$25,284.00	\$526,539.30	903.00		9.03	58310		11958 Keymar Road
LIPI-2018-STRE-0018	\$7,425.00	\$9,000.00	\$187,425.00	250.00		2.50	\$74,970.00		Toll Road
LIPI-2018-STRE-0019	\$17,163.30	\$20,804.00	\$433,243.30	743.00		7.43	58310		11601 Keymar Rd
LIPI-2018-STRE-0020	\$24,532.20	\$29,736.00	\$619,252.20	1062.00		10.62	58310		14802 New Windsor Rd
LIPI-2018-STRE-0021	\$23,100.00	\$28,000.00	\$583,100.00	1000.00		10.00	58310		14802 Toll Rd
LIPI-2018-STRE-0022	\$8,477.70	\$10,276.00	\$213,997.70	367.00		3.67	58310		12342 Warner Rd
LIPI-2018-STRE-0023	\$24,231.90	\$29,372.00	\$611,671.90	1049.00		10.49	58310		12737 Woodsboro Pike
LIPI-2018-STRE-0024	\$16,955.40	\$20,552.00	\$427,995.40	734.00		7.34	58310		12418 Warner Rd

LIPI-2018-STRE-0025	78	\$225,050.00	\$22,505.00	\$247,555.00	\$72,016.00	\$22,505.00	
LIPI-2018-DSWA-0001	4	\$5,000.00	\$500.00	\$5,500.00	\$1,600.00	\$500.00	
LIPI-2018-RSC-0001	25	\$40,050.00	\$4,005.00	\$44,055.00	\$12,816.00	\$4,005.00	
LIPI-2018-DSWA-0002	14	\$127,250.00	\$12,725.00	\$139,975.00	\$40,720.00	\$12,725.00	
LIPI-2018-RSC-0002	95	\$18,000.00	\$1,800.00	\$19,800.00	\$5,760.00	\$1,800.00	
LIPI-2018-DSWA-0003	12	\$22,850.00	\$2,285.00	\$25,135.00	\$7,312.00	\$2,285.00	

LIPI-2018-STRE-0025	\$14,853.30	\$18,004.00	\$374,933.30	643.00		6.43	58310		11538 Handboard Rd
LIPI-2018-DSWA-0001	\$330.00	\$400.00	\$8,330.00	100.00	2.58	2.58	\$3,230.02		North Glade Feed & Supply
LIPI-2018-RSC-0001	\$2,643.30	\$3,204.00	\$66,723.30	89.00		0.89	\$74,970.00		Tarr Drive
LIPI-2018-DSWA-0002	\$8,398.50	\$10,180.00	\$211,998.50	2545.00	1.71	1.71	\$123,975.73		Bunker Hill
LIPI-2018-RSC-0002	\$1,188.00	\$1,440.00	\$29,988.00	40.00		0.40	\$74,970.00		Woodsboro Pike 2
LIPI-2018-DSWA-0003	\$1,508.10	\$1,828.00	\$38,068.10	457.00	0.30	0.30	\$126,893.67		Detour Road